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T. H. Raskaliyev [a], ***N. D. Yesmagulova*** [a], ***O. B. Digilina*** [b]

[a] L. N. Gumilyov Eurasian National University (Nur-Sultan, Republic of Kazakhstan; e-mail: t.raskaliyev@gmail.com)

[b] Peoples' Friendship University of Russia (Moscow, Russian Federation)

INTEGRATION AND DEVELOPMENT OF THE DAIRY REGIONS IN THE EURASIAN ECONOMIC UNION: TRENDS, PROBLEMS AND PROSPECTS [1]

The paper focuses on the most important economic processes taking place in the dairy regions of the Eurasian Economic Union. The article reveals the specific features of the dairy sector's development in the chosen regions in the context of Eurasian integration. Moreover, it discusses the challenges faced by the regions and prospects of the regional development. Consequently, we formulated some recommendations for solving current problems. We based our study on the theoretical developments of various scientists and economists, and statistical and other information. We applied various methods of investigation, including analysis, comparisons and econometric modelling. We outlined some of the study's limitations related to a rather short history of the union's existence and insufficiency of the available statistical information. The procurement price for milk depends on a number of factors. Using the modelling tool, we have shown this dependence on the example of the Republic of Tatarstan, which is the largest region-producer of milk in the union. The study's scientific novelty is in determining the main directions of the dairy sector's transformation in the regions. Furthermore, our research proposes a model for assessing the influence of the certain factors on procurement prices in the industry. The study's results can be applied for developing and implementing the state and regional economic policies.

Keywords: Dairy industry, Eurasian Economic Union, regional development, economic integration, economic transformation, agriculture, dairy products, customs union, milk prices, milk processing, international trade

1. Introduction

The creation of the Eurasian Economic Union (EAEU) is the largest and most ambitious of the recent projects in the post-Soviet space. At present, the union includes five former Soviet states: Russia, Kazakhstan, Belarus, Armenia and Kyrgyzstan. Primarily, implementation of this project implied reduction of the trade barriers and establishment of a single market for goods and services. However, integration between the countries is now taking place in a more complex economic environment. Instability in the world energy markets (that are very important for Russia and Kazakhstan) and growing tensions in international trade cause some negative phenomena for the economies of the member states (MSs). In such conditions, the role of the integration in ensuring the further growth of national economies is increasing. The success depends on the effectiveness of each element of the created system.

The agro-industry traditionally occupies a central place in the economies of the MSs. In the context of the modern economic realities, it acquires great significance as a potential driver for further economic growth. At the same time, special attention is paid to the development of the member states' dairy sector, as it greatly contributes to ensuring the countries' food security. However, the regional aspects of this sector's functioning in the context of the trade liberalization are yet to be sufficiently investigated.

To achieve the research purpose we set the following tasks:

— to characterize the dairy regions of the EAEU countries and their main indicators;

— to identify the main trends in the development of the dairy regions in the context of Eurasian integration;

— to identify dairy sector's problems at regional level related to integration processes;

— to formulate recommendations for solving the regions' problems and improving the union's economic policy.

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We divided the article into sections that reveal different aspects of the study. The last section is the concluding part.

2. Theoretical and Historical Background

Canadian economist J. Viner made a significant contribution to the establishment of the economic integration theory by identifying two important integration effects: the effect of trade creation and the effect of trade diversion [1]. The scientist conducted a broad analysis of customs unions, examining their effect for the participating countries and for the outside world. Previous researchers rarely went beyond analysing the trade between two countries [2].

In the framework of subsequent research, Tinbergen considered integration as the creation of the most desirable structure of the international economy with the removal of obstacles to optimal activity [3]. Meade discussed the issue of changing the global use of economic resources in connection with the removal of the trade barriers [4].

Balassa defined integration as both a process and a state of affairs. He investigated integration's various forms, contributing to the development of the economic integration theory [5]. In his definition, the economic union combines removal of the restrictions for the movement of goods and factors with harmonization of the national economic policies (at least, to some degree) in order to eliminate any discrimination. The study of economic integration is continuing now by scientists from different parts of the world.

The EAEU is not an ordinary group of countries located in the same region and interested in creating customs union. United by the Soviet past, its member states were parts of a single economic entity [6]. Countries' political and cultural affinity plays an important role in their unification. Such affinity enables mutual understanding and rather successful communication between the states and societies [7]. For example, it is easier for Russian enterprises to deal with Kazakh and Belarusian counterparts than with Western partners due to similar ways of doing business and shared values [8].

After the dissolution of the Soviet Union in 1991, new independent states needed to ensure accelerated economic development [9]. The idea of forming the Eurasian Union as a new integration structure was formulated in 1994 by the President of Kazakhstan, Nursultan Nazarbayev. This concept implied the implementation of coherent economic policies and joint development programs by the participating countries. For Kazakhstan, where various ethnic, cultural and religious groups have been co-existing for centuries, Eurasia has a special significance [10].

Therefore, the first attempt to form the Eurasian Customs Union was made. In 1995, Russia, Kazakhstan and Belarus signed a corresponding agreement. Kyrgyzstan joined the initiative in 1996, and Tajikistan did it in 1997. However, this initiative remained declarative and did not change the ineffective institutional formula of the Commonwealth of Independent States (CIS) [11].

In 2000, after the election of Vladimir Putin as the President of Russia, the integration process received new impetus. Russia, Kazakhstan, Belarus, Kyrgyzstan and Tajikistan have established The Eurasian Economic Community (EEC). In 2006 Uzbekistan joined the block. In 2002 Ukraine and Moldova have become EEC observers. Armenia gained the observer status in 2003. At the same time, some events adversely affected the process of economic integration, including the Orange Revolution in Ukraine in 2004, and the suspension of Uzbekistan's participation in the integration in 2008. Thus, there were two false starts in the history of Eurasian integration [12].

Nevertheless, in 2007, Russia, Belarus and Kazakhstan signed an agreement on the creation of the single customs territory and formation of the customs union. This agreement exempted mutual trade in goods from customs duties and economic restrictions, except special protective, anti-dumping and countervailing measures. Moreover, it cancelled customs clearance and customs control on the internal borders. The customs union started working in 2010.

In 2011, the Presidents of Russia, Kazakhstan and Belarus have signed the Declaration on Eurasian Economic Integration, which noted the successful functioning of the Customs Union. Furthermore, the Declaration announced the transition to the next stage of integration, namely, the creation of the Common Economic Space (CES). The plan was to formulate coherent policies in various areas, provide the legislation's harmonization and the supranational institutions' development, etc. In 2013, the countries approved the Concept of coordinated agro-industrial policy of the MSs[1]. The basis of the CES was the principle of four freedoms: the flow of goods, services, money and labour [13].

Finally, in May 2014, three states signed the Treaty on the Eurasian Economic Union. Later

[1] Yevraziya: ot idei — k integratsii [Electronic source] Retrieved from http://www.eurasiancommission.org/ru/act/integr_i_makroec/dep_razv_integr/Documents/Издания/Евразия%202015.pdf (Date of access: 02.07.2018).

Armenia and Kyrgyzstan joined it. This Treaty entered into force on January 1, 2015Participants of the integration block adopted various documents regulating the relations between MSs in the analysed field. . Thus, the Concept of coordinated agro-industrial policy of the MSs and various technical regulations have been adopted [14]. Development of the uniform requirements to food products within the framework of the technical regulation is one of the basic trends of food security development in the union [15]. At present, the legal base of the EAEU is still being improved.

3. Research Methods

For studying particular regions of the EAEU countries, we examined the data of the Eurasian Economic Commission on the leading regions in the production of cow's milk. Moreover, we explored the information of national statistical bodies on the volumes of such production. For determining the regions' main characteristics, we disclosed the statistical information for the last reporting periods.

Further, we conducted the study of trends in the development of the dairy regions based on the time series analysis. The analysis was characterised by the explicit recognition of the importance of the order in which we made the observations [16]. Thus, the study examined the dynamics of various indicators, including milk and dairy production volumes, market prices and the parameters of foreign trade. The study also revealed changes of the indicators in relative terms. At the same time, we widely applied the method of comparative analysis, which is one of the most effective study techniques in contemporary economics [17]. This method clearly explains the differences between the regions. We determined the problems and prospects of these regions' development, based on the results of the conducted analysis and on the collected and analysed information from open sources. Along with this, we formulated some recommendations for solving the regional problems in accordance with the study's results.

We focused on determining the relationship between procurement prices of the milk processing enterprises for milk (which are very important for regional development) and various factors that affect them. For this purpose, we used a method of econometric modelling. The multiple regression model is the most widely used vehicle for empirical analysis in economics [18]. This model is used for examining the relationship between a dependent variable and independent variables [19]. The equation of the multiple regression is presented below:

$$Y = a + b_1x_1 + b_2x_2 + \ldots + b_nx_n, \quad (1)$$

where Y — dependent variable; a, b_1, b_2, ..., b_n — equation parameters; x_1, x_2, ..., x_n — factors, explanatory variables [20].

Given the purposes of analysis, in the used model variable Y presents the average procurement price of the milk processing enterprises for milk, and variables x_1, x_2, ..., x_n are the factors affecting procurement prices. We claim that the indicators determining the parameters of supply and demand for raw milk can be attributed to these factors. We carried out the modelling on the example of the Republic of Tatarstan due to its place among the milk-producing regions for milk production and the greater availability of the necessary statistical information for the last reporting period.

4. Dairy Regions of the EAEU Countries

According to the information of the Eurasian Economic Commission, in the regional context Russia has five regions-leaders in the production of milk: the Republics of Tatarstan and Bashkortostan, Altai and Krasnodar Regions and Rostov Oblast. The share of these regions in the country's total milk production in 2016 was 24 %. In the other EAEU countries, such regions are: Minsk and Brest Oblasts (46 %) in Belarus; East Kazakhstan, South Kazakhstan and Almaty Oblasts (42 %) in Kazakhstan; Chui, Jalal-Abad and Osh Oblasts (66 %) in Kyrgyzstan; Gegharkunik, Shirak, Lori, Aragatsotn and Syunik Marzes (almost 70 %) in Armenia[1].

Statistical information for 2017 shows that the aforementioned regions are still the largest producers of the dairy products. Given the size of the countries and the volume of milk produced, we included in the study five regions of Russia, two regions of Belarus and two regions of Kazakhstan, one region of Armenia and one region of Kyrgyzstan. Table 1 presents the regions under study and their main characteristics for the last reporting periods.

The regions vary significantly in terms of the role of various categories of economic entities in the production process. For example, a high share of the agricultural enterprises in total milk production (over 95 %) is typical for Belarusian regions. Peasant farms have a relatively high share

[1] Obzor molochnoy otrasli gosudarstv-chlenov Evraziyskogo ekonomicheskogo soyuza za 2012–2016 gg. [Survey of the diary sector of the EAEU countries for the period from 2012 to 2016]. (2017). Retrieved from: http://www.eurasiancommission.org/ru/act/prom_i_agroprom/dep_agroprom/sensitive_products/Documents/проект%20ОБЗОРА%20по%20молоку.pdf (Date of access: 21.09.2018).

Table 1

The main characteristics of the EAEU dairy regions in 2017

Country	Region	Volume of milk production, thousand tons	Population, thousands of people	Number of cows, thousands of heads	Average milk yield per cow, tons
Russia	Republic of Tatarstan (RT)	1,821.6	3,894.3	354.0	5.5
	Republic of Bashkortostan (RB)	1,718.4	4,067.0	434.4	5.0
	Altai Region (AR)	1,401.8	2,350.1	344.8	5.0
	Krasnodar Region (KR)	1,381.0	5,570.9	215.0*	6.4
	Rostov Oblast (RO)	1,091.6	4,231.3	289.2	4.6
Kazakhstan	East Kazakhstan Oblast (EKO)	876.8	1,389.6	473.2	2.2
	South Kazakhstan Oblast (SKO)	726.7	2,878.6	399.2	2.3
Belarus	Minsk Oblast (MO)	1,793.0	1,423.0	328.4	5.2
	Brest Oblast (BO)	1,605.0	1,386.4	284.3	5.4
Armenia	Gegharkunik Marz (GM)	142.5	230.7	59.9*	2.4**
Kyrgyzstan	Chui Oblast (CO)	398.2	921.7	134.2	2.9

Source: the information of the statistical bodies of the EAEU countries.

* The data of 2016.

** Calculated by the authors in accordance with the statistical information.

in CO and EKO (56.8 % and 31.8 % respectively). The households play a key role in the production of milk in SKO and RO (94.8 % and 84.2 % respectively).

5. The Main Trends in Development of the Dairy Regions

Milk production is one of the main items in livestock production and more broadly in agricultural production [21]. Table 2 shows the dynamics of cow's milk production volumes in surveyed regions during the period from 2014 (previous to the year when the EAEU began functioning) to 2017.

Table 2 demonstrates that under the conditions of the EAEU production volumes increased in the majority of the regions. The largest increase in 2017 compared to 2014 by 14.9 % occurred in MO. At the same time, some regions show a certain decline in production: in RB production volume decreased by 3.1 %, and in AR it decreased by 0.9 %. The decline is related to negative dynamics of the number of cows, which for the analysed period decreased by 12.1 % in RB and by 5.5 % in AR. At the same time, however, Russian regions increased the productivity of cows. Thus, the average milk yield per cow for the last year increased from 4,821 to 4,963 kilograms in RB, and from 4,758 to 4,971 kilograms in AR.

The activity of the agricultural producers depends on the market prices of their products. Raw milk in regional markets is sold in the national currency of each country. As a result of the analysis for the period from 2014 to 2017, it was clarified that the highest increase in its price occurred in SKO — by 29.5 %. AR and RO follow this region, as the prices there rose by 27.6 %. At the same time, in recent years CO and GM showed a decline in the price of raw milk: 4.8 % and 10.5 % respectively.

Table 2

Volumes of milk production in the EAEU dairy regions in the period 2014-2017

Country	Region	Volume of milk production, thousand tons			
		2014	2015	2016	2017
Russia	RT	1,728.3	1,753.7	1,774.5	1,821.6
	RB	1,773.1	1,812.3	1,730.9	1,718.4
	AR	1,414.9	1,414.9	1,400.3	1,401.8
	KR	1,302.1	1,327.6	1,357.0	1,381.0
	RO	1,079.8	1,080.6	1,089.3	1,091.6
Kazakhstan	EKO	775.7	789.5	836.4	876.8
	SKO	692.5	703.1	714.2	726.7
Belarus	MO	1,561.0	1,650.0	1,729.0	1,793.0
	BO	1,423.0	1,493.0	1,527.0	1,605.0
Armenia	GM	128.6	135.1	141.8	142.5
Kyrgyzstan	CO	361.9	372.5	388.0	398.2

Source: the information of the statistical bodies of the EAEU countries.

Table 3

Volumes of the production of some dairy products in the EAEU dairy regions for the period from 2014 to 2017, tons

Butter				Cheese			
2014	**2015**	**2016**	**2017**	**2014**	**2015**	**2016**	**2017**
RT							
16,846*	12,945*	15,208*	16,839*	18,719	26,720	25,599	40,684
RB							
7,144	8,263	7,529	16,170	12,601	13,196	13,187	13,510
AR							
16,014	19,055	20,347	21,062	71,341	83,089	83,212	94,664
KR							
9,700	10,100	10,100	9,800	23,700	27,200	23,400	14,500
RO							
2,900	2,700	2,000	2,428	9,200	10,600	11,600	10,815
EKO							
1,248*	1,181*	1,242*	1,118*	1,212**	1,229**	1,482**	548**
SKO							
36*	102*	138*	126*	451**	482**	873**	1,006**
MO							
24,400	23,800	25,800	n/a	35,900**	33,800**	27,800**	n/a
BO							
14,926*	18,777*	20,255*	21,342*	57,636**	60,367**	68,975**	66,107**
GM							
n/a	n/a	n/a	n/a	99.9	162.6	124.8	237.2
CO							
1,136	1,038	1,856	2,075	630	1,526	1,786	880

Source: the information of statistical bodies of the EAEU countries.

n/a — the data are not available.

* Including spreads (pastes).

** Except processed cheese.

In SKO the increase in milk price coincided with a significant rise in the price of the dairy products with high added value. CO was characterized by a very slight increase in prices for these products.

Analysing the changes in terms of dollars of the United States of America (USD) (given average exchange rates of national (central) banks for the year), we noted that prices for raw milk in this currency decreased in all of the regions. We connected the common decrease of milk price in USD to the depreciation of the national currencies of the EAEU countries against USD. The regions of Kazakhstan demonstrated the strongest (among analysed regions) price fall: by 31.5 % in EKO, and by 28.9 % in SKO for the considered period. At the same time, the lowest decrease of the price in USD was registered in the aforementioned Russian regions (AR and RO) — by 15.5 %. In CO and GM raw milk price reduced by 25.9 % and 22.8 % respectively. Thus, despite the growth of milk price in national currency in certain regions, those regions still had its decrease in dollar terms. Meanwhile, in CO and GM occurred the price fall in both currencies. The data analysis also shows that SKO and KR are the regions with the lowest and the highest prices per ton of milk: 344.5 and 568.2 USD in 2014, and 245.1 and 456.3 USD in 2017 respectively. Generally, considered Russian regions have the highest milk prices (in the range of 469 to 568.2 USD in 2014, and ranging from 386.6 to 456.3 USD in 2017). However, these regions demonstrate relatively low level of price fall (in the range of 15.5 % to 19.7 %).

The production of the dairy products ensures food security, employment of the population, promotes the agricultural development and economic growth. Besides, stable dairy production is one of the most important factors confirming the premise for effective use of the technical potential (equipment) in dairy production [22].

Different countries vary in the statistical approaches to grouping the goods. To ensure comparability, Table 3 includes the data on the dairy products with high added value, which are reflected in the statistical information of the EAEU countries with a similar name.

Thus, the largest increase in the output of butter occurred in SKO (in 3.5 times), as well as in RB

(more than two times). At the same time, RT, GM and SKO significantly strengthened their positions in cheese production (increase in more than two times).

Income flow into the dairy industry is affected by both changes in prices and changes in the volume of the dairy products sold [23]. Based on the data of the statistical agencies on prices in the regions, we clarifies their percentage changes for the period from 2014 to 2017.

Thus, the price (in national currency) for processed milk has increased in the highest degree in MO and BO (by 46.6 % and 27.9 % respectively). The smallest increase in prices (less than 5 %) for this product occurred in CO (0.5 %), GM (1.4 %) and AR (3.2 %). The price of butter has significantly increased in the majority of regions. The highest price increase for this product was registered in the mentioned Belorussian regions (by 71.5 % and 50.9 % respectively). The price grew by 53.6 % in SKO, by 51.5 % in AR, and by 51 % in RT. The price almost did not change (an increase by 0.6 %) in CO. All regions have demonstrated an increase in the value of cheese. EKO leads with a significant gap from other regions, as the price here increased by 47.1 %. Most of the Russian and Belarusian regions have shown an increase in prices in the range of 20–30 %. CO and GM have shown the smallest increase (by 11.1 % and 6.2 % respectively).

Considering the prices in dollars for the period from 2014 to 2017, we found out that the price for processed milk significantly fell down in SKO (by 40.1 %) and in EKO (by 36 %). The lowest decrease by 12.5 % was registered in GM. The biggest decline in butter's price in USD was noted in EKO (by 29.9 %), while in GM it increased by 22.7 %. We registered a massive price reduction of cheese in SKO, BO and MO (by 34.2 %, 33.3 % and 32.6 % respectively). The smallest decline in its price by 8.4 % occurred in GM. In the context of regions the prices for different products significantly varied:

— for processed milk — from 0.81 (MO) to 1.4 (CO) USD per litre in 2014, and from 0.63 (SKO and MO) to 1.1 (CO) USD per litre in 2017;

— for butter — from 6.29 (CO) to 10.86 (EKO) USD per kilogram in 2014, and from 4.93 (CO) to 8.64 (GM) USD per kilogram in 2017;

— for cheese — from 4.93 (GM) to 9.87 (BO) USD per kilogram in 2014, and from 4.51 (GM) to 8.15 (KR) USD per kilogram in 2017.

Moreover, during the analysis, we discovered that the regions with high prices of the dairy products (in USD) demonstrate huge price decline of these commodities for the considered period. For example, AR reduced the price for processed milk from 1.15 to 0.78 USD per litre or by 31.7 %. In EKO the price for butter (per kilogram) decreased from 10.86 to 7.62 USD or by 29.9 %. In BO the price for cheese fell down from 9.87 to 6.58 USD or by 33.3 %.

In today's globalized world, export and import play an important role in the country's economic situation [24]. "Trade in dairy products is very volatile, as dairy trade flows can be affected by (a) overall economic situation in a country, (b) fluctuations in supply and demand, (c) changing exchange rates and (d) political measures [25]."

The analysis of the indicators of the foreign trade in the regions for the period from 2014 to 2017 have demonstrated that the largest exporters of the dairy products are Belarusian regions. The lion's share (over 90 %) of the dairy products from these regions goes to the markets of the EAEU countries. At the same time, large volumes of imports were registered in different regions. It is noteworthy that Russian regions mainly import products from Belarus (over 70 %).

We can single out the following main trends in the area of mutual trade of the dairy regions with the EAEU countries.

For the period from 2014 to 2017, AR increased the export of concentrated milk and cream from close to zero volume to 3 thousand tons supplying it to Kazakhstan[1]. At the same time, BO reduced the export of this product from 106.6 to 70 thousand tons or by 32 % (the data of Belarusian regions for 2017 are preliminary).

In MO the exports of the concentrated milk and cream increased from 23.6 to 35.9 thousand tons or by 52.1 %. At the same time, the imports (mainly from Belarus) of this product increased more than 3 times in KR going from 0.17 to 0.55 thousand tons.

In addition, MO increased the export of butter from 16.1 to 21.4 thousand tons or by 32.9 %. A significant increase in imports of this product was registered in KR and RO: from 0.2 to 0.4 thousand tons and from almost zero volume to 0.1 thousand tons respectively.

Export of cheese and cottage cheese increased more than 2 times in KR growing from 0.03 to 0.07 thousand tons. This increase, mainly, was due to the growth of supplies to Kazakhstan. At the same time, SKO increased imports of these products from almost zero value to 0.02 thousand tons.

Thus, in the regions there is a transformation of the dairy sector under the influence of the in-

[1] Export and import of Russia by goods and countries. Retrieved from http://en.ru-stat.com/database/ (Date of access: 15.09.2018).

tegration processes. For the considered period, a significant expansion of the resource base occurred in Belarusian regions and in EKO. At the same time, in RB and AR the reverse process took place, accompanied by a decrease in the number of cows. However, in connection with increased competition, Russian regions tend to increase the productivity of cows. This is evidenced by the latest data on the average milk yield in these regions. In the new economic realities, a re-specialization of regions in the sphere of dairy production takes place. The production of butter in SKO and RB has increased several times. The production of cheese grew in SKO, RT and GM. Simultaneously, KR and EKO have lost their positions in the production of cheese. In turn, Belarusian regions continue to maintain high volumes of the dairy production.

The observed trends also indicate a gradual alignment of the regional prices for dairy products. During the examined period, the greatest increase in prices (in national currencies) occurred in the Belarusian and Kazakhstani regions. In Russian regions, the increase is relatively low. The smallest price increases (or even its decreases) occurred in CO and GM. This phenomenon is explained by the influence of the mutual trade and the difference in regional prices in dollars. At the same time, in the mutual trade we marked the strengthening of the export positions of Belarusian regions. Moreover, we observed the greatest growth in imports in the Kazakhstani regions, KR and RO.

6. The Model

The analysis of scientific and other literature suggests that there are various approaches used for milk price modelling. The models (usually multiple regression ones) developed by different authors demonstrate the dependence of milk price on several indicators (factors). Some researchers pay special attention to cost indicators. Thus, Saravanakumar and Jain presented price determination model for milk based on the cost of the production model. They noted that the price of milk ought to be at a level, which covers the cost and leaves sufficient margins to farmers. The pricing model offered by the researchers took into account such indicators as prices of green fodder, dry fodder, wage rate, veterinary, fixed and miscellaneous cost [26]. The researchers used in their work the methodology developed by Kumar who presented it in 1984 in his study on price policy model of sugarcane and its products. He explained that the cost of production depends on prices of variable and fixed inputs, as well as on technology used in production process [27].

Another approach to modelling of milk price supposes the use of the data on prices for finished dairy products since they directly determine farm-gate price of milk [28]. Thus, International Dairy Model presented by Food and Agricultural Policy Research Institute (FAPRI) suggests calculations based on the information about prices for five commodities: milk, butter, cheese, nonfat dry milk and whole milk powder. At the same time, there are differences between country and regional modules given data availability[1]. For example, in the model of the United Kingdom producer price of milk is presented as the function of prices of cheese, butter, skim milk powder, whole milk powder, and relevant shares of these commodities production of total milk available for manufacture[2]. Estonian researchers, Põldaru, Roosmaa and Roots, in the study on modelling of milk price on the example of their country, followed FAPRI methodology. Nevertheless, their model supposes that milk price depends on three independent variables (factors): price of cheese, price of butter and price of barley [29].

Besides, the farm-gate price fluctuates in response to a shift in aggregate supply relative to demand, and vice versa [30]. There have been cases in dairy markets when growing supply of milk amid falling demand led to decreasing of milk prices [31]. It means that volumes of the milk production play an important role in determination of milk prices, thus, it should be included in the pricing model.

Therefore, for analysis purposes researchers include in their models different factors, taking into account the availability of the necessary statistical information. In our opinion, extended determination model of milk price should include the following factors: the volume of milk production by agricultural producers, the cost of milk production, market prices for finished dairy products and the parameters of the dairy products' output. We included these prices and parameters since they determine processors' opportunities to buy raw milk and influence their demand.

However, during the modelling, we clarified some limitations due to the lack of some information. For example, there is no necessary statistical information on the costs of milk production. In the analysed region, the households produce more

[1] International Dairy Model. Retrieved from: http://www.fapri.iastate.edu/models/dairy.aspx (Date of access: 05.11.2018).

[2] FAPRI-UK Model Documentation (2011). Retrieved from: https://www.afbini.gov.uk/sites/afbini.gov.uk/files/publications/%5Bcurrent-domain%3Amachine-name%5D/UK%20model%20documentation%20FAPRI%202011.pdf (Date of access: 05.11.2018).

Table 4

Input data, roubles per kilogram/litre

Year	Quarter	Procurement price for milk	Volume of milk production, thousand tons	Price for pasteurized milk (2.5–3.2 % of fat content)	Price for butter	Price for cheese	Export price of Belarus for concentrated and powdered milk and cream*
		Y	X_1	X_2	X_3	X_4	X_5
2015	I	22.03	384.1	38.14	314.71	378.56	139.95
	II	18.65	485.4	37.84	319.19	362.58	123.87
	III	17.34	488.3	37.74	322.30	349.41	119.02
	IV	20.44	395.9	38.86	330.41	357.20	136.66
2016	I	21.84	395.0	38.95	319.36	358.35	151.00
	II	20.28	489.0	39.19	323.31	364.41	151.67
	III	20.34	489.8	39.47	336.80	366.72	141.41
	IV	25.39	400.7	41.15	379.55	382.79	143.64
2017	I	27.83	404.3	42.13	417.34	398.59	142.47
	II	23.23	500.3	42.85	429.35	401.01	121.00
	III	22.38	501.8	43.38	438.25	402.89	113.81
	IV	24.48	415.2	43.78	441.83	407.92	100.23
2018	I	22.59	411.4	44.24	443.12	403.78	109.73
	II	19.64	500.3	44.09	441.17	401.61	118.40

Source: the information of the territorial body of the Federal State Statistics Service and Ministry of Agriculture and Food of the Republic of Tatarstan.

* Calculated by the authors (based on export volumes from Belarus to Russia and the average exchange rates of the rouble against the USD for analysed periods) according to the data of UN Comtrade Database and the statistics of Eurasian Economic Commission on international trade.

than 30 % of milk and this fact causes the lack of information on costs. In addition, there is no statistical information on the volumes of the dairy products produced by processors in terms of considered periods (quarters), and the prices of some dairy products. In this regard, it is not possible to include some factors in the model.

Given the above, during the modelling process we took into account local volumes of raw cow's milk production and market prices for the main types of dairy products. They helped to determine the dependence of procurement prices of milk-processing enterprises for milk on various factors. We carried out the modelling process using the equation described in section 3 "Research Methods".

At the same time, in the process of research we discovered that in the considered period imports of the dairy products largely satisfied the needs of some regions. Belarus is the leader among exporting countries (especially for Russian regions). Recently representatives of some regions stated the significant influence of the imports of Belarusian powdered milk on the prices of the locally produced raw milk.

We took into account this information along with the fact that the modelling was carried out on the example of the Russian region. That is why we included the export price of Belarus for concentrated and powdered milk and cream (in international trade statistics powdered milk is included in this category of goods) as an additional factor in the model. This price can influence the result, as it determines the preferences of processors: to use powdered milk or raw milk, offered by local farms, in the production process. Thus, in the developed model, the dependent variable Y is the procurement price of milk-processing enterprises for milk. The independent variables (factors) are the following:

— x_1 — the volume of milk production by local agricultural producers;

— x_2 — market price for processed milk;

— x_3 — market price for butter;

— x_4 — market price for cheese;

— x_5 — export price of Belarus for concentrated and powdered milk and cream.

We carried out the modelling on the example of RT, which is the largest region-producer of milk in the EAEU. During the modelling we used quarter volumes of milk production and average quarter prices for the period from 01/01/2015 to 30/06/2018 (from the day of beginning of EAEU functioning).

Given the availability of statistical data, the indicators shown in Table 4 were included in the model.

We carried out the modelling using Excel data analysis package. During the development of the model, we noted a high level of correlation of fac-

tors x_2 and x_4 with other factors (multicollinearity). Moreover, we noticed they had a high level of p-value. In this regard, we excluded factors x_2 and x_4 from further calculations. As a result, we obtained a multiple regression model of the following form:

$$Y = 4.11 - 0.027x_1 + 0.047x_3 + 0.096x_5 \quad (2)$$

Coefficient of determination $R^2 = 0.79$. It shows that 79 % of the variation in the dependent variable can be explained by the independent variable, while 21 % can be explained by the other factors. Other factors include the data not registered by the official statistics, such as "grey" imports, falsification of the products, etc.

Analysis of the regression equation using the F-test have demonstrated its significance since $F_{value} = 12.8$ and $F_{table} = 2.2$. In general, the model is statistically significant with a probability of 0.95.

The results have shown that among the selected factors the most important one is the export price of Belarus for concentrated and powdered milk and cream. This fact have confirmed the assumption about significant impact of the partner country's price for this product on the price of raw milk in the region. With the growth of prices for imported powdered milk, local processors are becoming more interested in buying raw milk from the regional farmers. In case of the reduction in the product's price, the reverse process is taking place.

The next important factor is the butter's price. When the market prices for finished product are growing, processors are interested in its production and, respectively, in the procurement of a large amount of raw milk. Such interest causes an increase in prices for milk, and vice versa.

At the same time, we noted the negative impact of the volumes of milk production by local agricultural producers on procurement prices. It can be explained by the fact that the growth of supply in the market leads to its saturation or even to the formation of surpluses that reduce prices. Seasonal changes in milk prices are directly related to fluctuations in the volume of its production.

7. Problems, Prospects and Recommendations

The process of the economic integration creates certain positive effects due to the reduction of trade barriers, the expansion of the market for producers. Moreover, it increases population's access to various products and business' access to resources and technologies. However, this process may be accompanied by the emergence of various problems. They include increased competition, higher costs of economies transformation, unfair activities of some entrepreneurs, etc.

The volatility of purchase prices is one of the cumbersome factors for the development of milk farming [32]. The processors who are the largest buyers of raw milk significantly affect the products' pricing in the market. Seasonal fluctuations in supply influence the situation, too. Recently in some dairy regions of the EAEU, a significant reduction in procurement prices for raw milk has been registered. The analysis of statistical information shows that this trend is clearly manifested in RT. During the first half of 2018, the average procurement price decreased from 23 to 18.38 roubles per litre or by 20.1 %. At the same time, the price of milk in June 2018 was 15.6 % lower than the price in June 2017. It the lowest price since September 2015 (when the price of a litre of milk was 17.79 roubles). Another example is the situation in GM where the average milk price decreased from 210 to 140 drams per litre in May 2018[1] and to 110 drams per litre in June[2].

Some Russian officials and agrarian sector's representatives link the problem of decline in procurement prices with the growth of the imports of powdered milk from Belarus to their regions. As noted above, this country is the main exporter of the dairy products to the markets of other EAEU countries. Besides, as the model's input data have shown, in 2017 the average export price of Belarus for concentrated and powdered milk and cream had significantly decreased (from 142.47 to 100.23 roubles per kilogram). This process certainly affected the prices for raw milk in RT. The cheapness of imported powdered milk encourages processors to expand its use in the production process and respectively reduces the demand for raw milk offered by local farmers.

The results of our milk price modelling show that the aforementioned export price plays the most important role (among other chosen factors) in determining the procurement prices in RT (with coefficient of 0.096). Along with this, according to the model, there are two other explanatory variables with less influence (coefficients: -0.027 and

[1] Fermery nazhalovalis pravitelstvu — krupnykh molochnikov Armenii vyzovut na kover [Farmers complained to the government: Armenian major dairy farmers will be called on the carpet]. (2018). Retrieved from: https://ru.armeniasputnik.am/society/20180614/12652883/fermery-nazhalovalis-pravitelstvu-krupnyh-molochnikov-armenii-vyzovut-na-kover.html (Date of access: 21.09.2018).

[2] Proizvoditeli moloka trebuyut povysit zakupochnye tseny [Milk producers demand higher procurement prices]. (2018). Retrieved from: https://ru.a1plus.am/1352828.html (Date of access: 21.09.2018).

0.047). However, during the modelling we discovered that 21 % of the variation in the dependent variable can be explained by the other factors, values of which are not registered by official statistics. Relying on information (partially presented below) from open sources, we claim that these factors may include "grey" imports, falsification of products, etc.

In real life, not only entities that carry out legal activities but certain unscrupulous sellers and buyers from different sides use the liberalization of trade relations within the integration block for business development. A feature of "grey" economic activities means that transactions often get misstated or go unreported [33]. The grey importers are able to import goods into the country at lower prices compared to the agents authorized by the right holder [34].

The problem of "grey" imports strengthens the decline in procurement prices for raw milk. In addition, it stimulates the growth of unfair competition and falsification of goods. The problem of falsified products' turnover in the dairy market is one of the main problems in the integration block. According to the ex-Minister of Agriculture of the Russian Federation, Alexander Tkachev, all the ills of the dairy industry in this country are related to "grey" imports, falsification and violation of technical regulations in production. Such ministrations, in total, replace up to 3 million tons of milk per year. In addition, the former minister noted that re-export from Ukraine, Lithuania and Estonia is the main component of "grey" imports[1].

The state bodies of Russia ensure regular monitoring of the situation on falsified products. According to the results of research conducted by the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor) in February-March 2018, 8.9 % of the tested milk samples and 8.2 % of the tested cottage cheese samples were falsified using vegetable fats[2].

Analysing statistical data, we clarified that some regions are characterized by negative dynamics in the size of herd. The presence of the aforementioned problems promotes the loss of local population's interest in agricultural activities. The data show that for the period from 2015 to 2017 the number of cows decreased: by 12.5 thousand heads in RT, by 51.1 thousand heads in RB, by 3.6 thousand heads in AR. With continuation of the fall in procurement prices, this process may intensify.

In turn, the ruin of farmers can lead to appearance of other important problems for the state, such as the growth of unemployment, inefficiency of investment and subsidies, non-return of loans. The EAEU countries invest huge amounts of money in the development of agricultural sector. For example, only the volume of the product-specific support for milk production, according to preliminary data for 2017, amounted to 285.8 million USD in Russia, to 93.5 million USD in Belarus, and to 29.3 million USD in Kazakhstan[3]. However, during the study we discovered that the regions experiencing the decrease of herd size tend to increase the productivity of cows in connection with growing competition.

Generally, the growth of the imports, decline in prices for raw milk and low competitiveness of the local producers cause concern among the authorities. Issues of support for domestic producers are discussed at different levels, and enough suggestions to impose any restrictions on the imports occur. The states usually play an important role in ensuring sustainable agro-industrial development. The supports help dairy industry to stabilize their profits and increase their competitiveness during the economic crisis [35]. Because the EAEU's framework does not provide for establishment of tariff barriers between the countries, some individuals propose non-tariff measures. Recently, as a result of various control measures undertaken by Russia and Kazakhstan, restrictions had been repeatedly imposed on the supply of the dairy products from Belarus and Kyrgyzstan, respectively. At the same time, for this reason, serious conflicts and disputes have arisen between these countries. The former group of countries declared their intention to ensure the importation of only qualitative products to their territories. The latter pair of countries perceived these measures as protectionism and initiated proceed-

[1] Tkachev: falsifikat i seryy import zameshchayut v RF do 3 mln tonn moloka v god [Tkachev: counterfeit and gray imports replace up to 3 million tons of milk per year in the Russian Federation]. (2018). Retrieved from: https://milknews.ru/index/novosti-moloko_16744.html (Date of access: 21.09.2018).

[2] Rospotrebnadzor nazval dolyu falsifitsirovannoy rastitelnymi zhirami molochnoy produktsii [Rospotrebnadzor stated the proportion of the dairy products falsified with vegetable fats]. (2018). Retrieved from: https://rns.online/consumer-market/Rospotrebnadzor-nazval-dolyu-falsifitsirovannoi-rastitelnimi-zhirami-molochnoi-produktsii--2018–05–14/ (Date of access: 21.09.2018).

[3] Obzor molochnoy otrasli gosudarstv-chlenov Yevraziyskogo ekonomicheskogo soyuza za 2012–2016gg. [Survey of the diary sector of the EAEU countries for the period from 2012 to 2016]. (2017). Retrieved from: http://www.eurasiancommission.org/ru/act/prom_i_agroprom/dep_agroprom/sensitive_products/Documents/проект%20ОБЗОРА%20по%20молоку.pdf (Date of access: 21.09.2018).

ings at the level of the supranational bodies of the EAEU. However, product quality and safety issues have become central features in the international markets for food products [36].

During the analysis of mutual trade between considered regions, we discovered that Belarusian regions are the main exporters of the dairy products. Over 90 % of Belarusian export goes to the markets of the EAEU countries. The results of our trade volumes' analysis show that MO is strengthening its positions in the union's market. Thus, for the period from 2014 to 2017, the region has increased export of concentrated milk and cream by 52.1 % and of butter by 32.9 %. At present, however, trade restrictions established for some enterprises are the serious problem for Belarusian regions. According to the Register of organizations and persons engaged in the production, processing and (or) storage of controlled goods (moved between the EAEU countries) as of September 4, 2018:

— in MO 7 organizations and persons out of 30 have warnings, 6 have restrictions on supplies to Russia, 3 are subject to strengthened laboratory control;

— in BO 2 such organizations and persons out of 19 have warnings, 4 have restrictions on supplies to Russia.

In case of long-term use or strengthening of trade restrictions in the future, this problem can very negatively affect Belarusian dairy regions, considering their focus on the markets of the EAEU.

Development prospects of the dairy regions depend on the future changes in market conditions, behaviour of the market participants, initiatives of industry associations (unions). Moreover, they depend on decisions of the state bodies of the MSs and the supranational bodies of the EAEU. In this study, we explored the transformation of the regional dairy sectors in the context of economic integration. Some regions demonstrate growth. Other regions show decline of production volumes of milk and dairy products, local market prices for these commodities, and trade amounts. Despite the differences, the dairy industry in all of the reviewed regions has some development potential because the needs of regional and all-union markets are not fully satisfied to date.

The countries of the EAEU (including some regions) have their programs or other documents on the development of agriculture in general and the dairy sector in particular. Based on the trends and provisions of these documents, we noted that in most of the regions in the near future, with the state support, the increase in milk production would continue. However, given the realities of the recent times (reduction in the number of cows in certain regions, restrictions on trade), a general slowdown in production growth is possible.

The parameters of the dairy industry's development in the regions will largely depend on the overall economic situation in the countries. With a decrease in the solvency of the population, the range of the dairy products will change as the amount of goods with substitutes for milk fat will increase, and vice versa. In the absence of the trade restrictions and increased competition, the gap between regional prices for milk and dairy products will continue to decrease. Such conditions will put serious pressure on producers with relatively high production costs. The main task for many enterprises will be the reviewing of development strategies in order to ensure competitive advantages.

In turn, the high activity of the state supervisory bodies, the amount of the detected violations and set restrictions can affect the mutual trade's intensity. Simultaneously, this activity can contribute to further strengthening of the trade conflicts between countries and reorientation to partners' foreign markets that have restrictions on their enterprises. The reorientation process is already taking place today. Only in January-July of 2018 Belarusian enterprises increased the export of the dairy products to China more than 5 times[1].

To solve the current problems we recommend the implementation of a number of measures. First, it is necessary to adopt an overall strategy for the development of the EAEU dairy sector (Strategy). In this document, special attention should be paid to regional aspects. Those aspects include determination of perspective specialization, and establishment of the development indicators, including recommended maximum volume of the milk production for each dairy region (given the capacity of the domestic market and export potential). The strategy should become a guide for national and regional policy documents. In addition, local authorities should consider the strategy when providing support to farmers. To prevent negative events, the authorized supranational body should periodically monitor and analyse the indicators of the regions suggesting development proposals for improving regional policies.

At the same time, milk processors should become one of the main objects of influence. From the analysis of the statistical data, it follows that

[1] Belarus uvelichila eksport molochnoy produktsii v Kitay v 5,6 raza [Electronic source] Retrieved from http://www.belmarket.by/belarus-uvelichila-eksport-molochnoy-produkcii-v-kitay-v-56-raza (Date of access: 22.09.2018).

the growth of the dairy products' market prices does not always lead to an increase in procurement prices for milk. With this in mind, it is necessary to create incentives for processors to increase payments to suppliers in case of favourable market's prices for finished products. For dairy regions that constantly face the problem of a significant decline in procurement prices, we recommend to include procurement prices of the processor in the list of the criteria considered when providing support to that processor.

Moreover, we recommended the creation of an all-union fund for insurance against crisis processes in the dairy sector. In our opinion, this fund should be formed through the contributions of the MSs. The volumes of the MSs' contributions should be proportional to both the amounts of their exports of milk and dairy products to the EAEU countries and the amount of state support for the dairy sector. In turn, the fund's resources, primarily, should be spent on the insurance payments to the regions, in which there was a strong decline in procurement prices for milk due to the growth of imports from the EAEU countries. Such payments would compensate some losses of the local farmers. They would help the regions (at least in minimal amounts) to preserve agriculture, which is very important for their stable development. At the same time, it is necessary to set a condition that only the regions that fully complied with the provisions of the Strategy can receive insurance payments. This fund might become the basis for the establishment of the unified agrarian budget of the EAEU, following the example of the European Union.

Along with this, we believe it is necessary to stimulate the entrepreneurs' international cooperation and increase mutual investment, exchange of technologies. For this purpose, we recommend the provision of the favourable conditions for the EAEU's joint ventures. To do so, in our opinion, it is required to launch pilot projects in a number of the dairy regions to free joint ventures from taxation at the initial stage of activity. At the same time, it is necessary to unify the relevant tax norms for all the EAEU's countries.

It is also necessary to equalize competition conditions for producers, depending on the content of their products. The Technical Regulation of the Customs Union "On the Safety of Milk and Dairy Products" provides definitions for different types of the products that should be used by manufacturers. However, not every consumer can understand the differences between their species. In this regard, we recommend introducing a special sign, indicating that the product is produced without the use of powdered milk and milk fat substitutes. Simultaneously, the high liability for violation of the requirements for designating the products with this sign should be provided. These measures would help to equalize the competition's conditions and improve the position of the producers, focused on production of the high-quality products.

8. Conclusions

The dairy regions play a key role in ensuring the sustainable development of the agro-industry of each member state and the whole EAEU. In addition, they significantly contribute to ensuring food security. The regions considered in this research notably differ in their socio-economic characteristics and activity in mutual trade.

The results of the conducted research have affirmed the ongoing process of regional economies' transformation, changes in the parameters of production of the dairy products and prices under the influence of integration processes. At the same time, the dynamics of milk production in most regions, as well as the content of the national and regional program documents, have indicated the optimistic mood of agrarians and government agencies for the future. Some regions over the years of the EAEU's functioning have demonstrated an increase in milk production by more than 10 %. In the dairy industry of the regions, we observed both positive and negative changes in the output of certain types of products. This phenomenon is associated with the increasing competition in local markets, and an increase in the presence of products from the MSs in certain regions. At present, many manufacturers aim to revise the range of offered products, to find a new market niche and to increase their own competitiveness.

Analysis of prices for milk and dairy products have shown that the average prices for these goods in national currencies steadily increase in most regions over the considered period. However, economic integration has helped to reduce the differences between regional prices. We also have found that the largest increase in prices for raw milk is typical for the regions in which prices for the dairy products with high added value increased significantly.

Big transformations are also happening in the area of mutual trade between the regions and the EAEU countries. Some regions have repeatedly increased the exports or imports of the products. This notion indicates a revision of the regions' specialization. The study have also found that the main exporters of the dairy products to the mar-

kets of the EAEU countries were Belarusian regions. At the same time, for these regions, the union's markets (especially the market of Russia) play a vital role, since the lion's share of exported products is realized in this direction.

In addition, the study have disclosed the problems bothering the authorities of some regions and the MSs: a significant decline in procurement prices for milk, the presence of "grey" imports and the facts of the products' falsification, etc. The presence of these problems hinders the normal functioning of the EAEU, causing trade disputes between partners. Thus, we determined the development prospects of the dairy regions, given today's realities.

To solve the current problems of the dairy regions' development the implementation of the different administrative, economic and financial measures is required. Based on the results of the study, we have formulated some recommendations that, in our opinion, can help to improve the situation. Nevertheless, the development processes in the EAEU dairy regions require constant attention of the scientists and officials to make timely managerial decisions that can prevent the emergence of negative situations in the future.

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Authors

Timur Hasanovich Raskaliyev — PhD Student, L. N. Gumilyov Eurasian National University; ORCID: 0000–0003–4795–4701; Researcher ID: R-8519–2018 (11, Kazhymukan St., Nur-Sultan, 010000, Republic of Kazakhstan; e-mail: t.raskaliyev@gmail.com).

Nurgul Dyusenovna Yesmagulova — PhD in Economics, Professor, Department of Economics and Entrepreneurship, L. N. Gumilyov Eurasian National University (11, Kazhymukan St., Nur-Sultan, 010000, Republic of Kazakhstan; e-mail: nurdil25@mail.ru).

Olga Borisovna Digilina — Doctor of Economics, Professor, Department of Political Economy, Peoples' Friendship University of Russia; Scopus Author ID: 56150710600; ORCID: 0000–0002–9148–6776 (6, Miklukho-Maklaya St., Moscow, 117198, Russian Federation; e-mail: o.b.digilina@mail.ru).